

Mark A. Christon

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Areas of Research

Computational Fluid/Hydro Dynamics, Computational Mechanics
Fluid-Structure Interaction, Parallel Algorithms
Numerical Methods for Partial Differential Equations

Education

B.S. Colorado State University, May, 1982, Mechanical Engineering
M.S. Colorado State University, December, 1986, Mechanical Engineering
Ph.D. Colorado State University, May, 1990, Mechanical Engineering

Employment History

Engineer – Los Alamos National Laboratory, Los Alamos, New Mexico, 2005 – present
Principal Development Engineer – ABAQUS, Providence, Inc., RI, 2005 – 2006,
Distinguished University/Laboratory Professor – Univ. of New Mexico, 2003 – present
Engineer – Sandia National Laboratories, Albuquerque, New Mexico, 1995 – 2004
Senior Scientist – Livermore Software Technology Corp., Livermore, California, 1999 – 2001
(Entrepreneurial Leave from Sandia National Laboratories)
Engineer – Lawrence Livermore National Laboratory, Livermore, California, 1990 – 1995
Research Associate – Advanced Technical Computing Staff, Colorado State Univ., 1986 – 1990
Engineer – Advanced Systems Program, Texas Instruments, Dallas, Texas, 1982 – 1983

Research Experience

Interface Tracking/Capturing for Penetrator Simulations, principal investigator, ASCI Program, Sandia National Laboratories, 2003 – 2004.

High-resolution algorithms for conservation laws as a generalized simulation framework, principal investigator – Mathematical, Information and Computer Sciences Program, Sandia National Laboratories, 2002.

XAXON – efficient hydro solution methods for structured & hybrid grids using ALEGRA, principal investigator – Computational Sciences Research Foundation, Sandia National Laboratories, 2001 – 2003.

Big Eddy – Advanced large eddy simulation algorithms for complex flow physics, principal investigator – Laboratory Directed R&D, Sandia National Laboratories, 1998 – 1999.

HELIOS: development of parallel, code independent, coupling technology, co-investigator – DOD-DOE memorandum of understanding, Sandia National Laboratories, 1997 – 1999.

Magneto-hydrodynamics using the ALEGRA Framework, co-investigator – Computational Sciences Research Foundation, Sandia National Laboratories, 1997.

An investigation of wavelet bases for the grid-based solution of partial differential equations, principal investigator – Laboratory Directed R&D, Sandia National Laboratories, 1997 – 1998.

A turbulent, chemically reacting flow investigation using MPSALSA, co-investigator – Laboratory Directed R&D, Sandia National Laboratories, 1996.

Large-scale fluid/structure interaction, co-investigator – CRAY SuperCRADA, Lawrence Livermore National Laboratory, 1995.

Large-eddy simulation of turbulent, separating flow, using the finite element method, co-investigator – Laboratory Directed R&D, Lawrence Livermore National Laboratory, 1995.

Structural Acoustics, co-investigator – Laboratory Directed R&D, Lawrence Livermore National Laboratory, 1993 – 1995.

DYNA for fluids, co-investigator – Laboratory Directed R&D, Lawrence Livermore National Laboratory, 1993 – 1995.

HYDRA: A flow solver for three-dimensional, transient, incompressible, viscous flow, principal investigator, Computational Mechanics Thrust Area, Lawrence Livermore National Laboratory, 1992 – 1994.

INGRID, A 3-D mesh generator for modeling nonlinear systems, principal investigator – Computational Mechanics Thrust Area, Lawrence Livermore National Laboratory, 1991.

Un-sponsored Research:

GILA - a massively parallel, second-order projection flow solver, 1997 – 1999.

SPYGLASS - a visualization toolkit for massively parallel TeraScale simulations, 1998.

A second-order, monotonicity preserving advection scheme for unstructured meshes, 1997.

Parallel radiation transport algorithms for fire simulation, 1996.

Teaching Experience

Courses:

Intro. to Computational Fluid Dynamics for Incompressible Flow (ME504/404), Mechanical Engineering Department, University of New Mexico, Fall, 2002.

Intro. to Computational Mechanics (ME504/404), Mechanical Engineering Department, University of New Mexico, Spring, 2000.

Energy Fundamentals (Thermodynamics AREN-2020), Civil and Architectural Engineering Department, University of Colorado – Boulder, Spring, 1989.

Thermodynamics (ME337), Mechanical Engineering Department, Colorado State University, Fall, 1989.

Supercomputer Applications I (GS510), Colorado State University, Fall, 1989, lectures on scientific visualization, vectorization.

Supercomputer Applications II (GS511), Colorado State University, Spring, 1989, lectures on vectorization, Krylov methods for PDEs.

Mechanics of Materials (CE360), – teaching assistant, Civil Engineering Department, Colorado State University, Fall, 1985.

Workshops:

NSF Supercomputing Summer Institute, Colorado State University, 1987, (taught sessions on graph-based bandwidth minimization for unstructured grids, grid generation, visualization and video animation).

Service and Honors

Service: Editorial Board *International Journal for Numerical Methods in Fluids* – 2002
Technical Program Chair *2003 US National Congress on Computational Mechanics*
Chair *USACM Committee on Meshfree Methods* – 2003 – 2005
Chair/Co-chair *Fluids I, II* – ICES '98
Co-chair *Meshfree Particle Methods Symposium I* – ICES '98
Chair *Meshless Methods III* – Fourth World Congress on Computational Mechanics
Tutorials committee – SC'97
Meshing Roundtable chair – Supercomputing '94
Program committee – Supercomputing '91
Committee chair for Best Student Paper Award – Supercomputing '91

Honors: ACM/IEEE Supercomputing '90 – Overall Best Student Paper
Member of Sigma Xi, Pi Tau Sigma, and Tau Beta Pi
ASME Roy Rothmel Scholarship, Fall, 1985
Colorado Graduate Fellowship, 1984

Societies: U.S. Association for Computational Mechanics
American Society of Mechanical Engineers
American Institute of Aeronautics and Astronautics

Publications – Archival

- D. G. Tipton, M. A. Christon, and M. S. Ingber, “Coupled fluid-solid interaction under shock wave loading: Part-I – static interfaces,” *submitted to International Journal for Numerical Methods in Fluids*, 2007.
- D. G. Tipton and M. A. Christon, “Coupled fluid-solid interaction under shock wave loading: Part-II – dynamic interfaces,” *submitted to International Journal for Numerical Methods in Fluids*, 2007.
- G. Scovazzi, M. A. Christon, T. J. R. Hughes, and J. N. Shadid, “Stabilized shock hydrodynamics: I. a Lagrangian method,” *Computer Methods in Applied Mechanics and Engineering*, vol. 196, pp. 923–966, 2007. (Sandia Report SAND2005-7563J, University of Texas ICES Report 05-48).
- M. A. Christon and R. S. Patil, “A finite element projection method for low-Mach number reacting flows,” in *Third MIT Conference on Computational Fluid and Solid Mechanics* (K. J. Bathe, ed.), (New York), pp. 617–622, Elsevier, June 2005.

- M. A. Christon, M. J. Martinez, and T. E. Voth, "Generalized Fourier analysis of the advection-diffusion equation – part I: One-dimensional domains," *International Journal for Numerical Methods in Fluids*, vol. 45, pp. 839–887, 2004.
- T. E. Voth, M. J. Martinez, and M. A. Christon, "Generalized Fourier analysis of the advection-diffusion equation – part II: Two-dimensional domains," *International Journal for Numerical Methods in Fluids*, vol. 45, pp. 889–920, 2004.
- M. A. Christon, P. M. Gresho, and S. B. Sutton, "Computational predictability of natural convection flows in enclosures," *International Journal for Numerical Methods in Fluids*, vol. 40, pp. 953–980, 2002.
- M. A. Christon, "LS-DYNA and the 8:1 differentially-heated cavity," *International Journal for Numerical Methods in Fluids*, vol. 40, pp. 1133–1144, 2002.
- M. A. Christon, "Dealing with pressure – solution strategies for the time-dependent navier-stokes equations," *International Journal for Numerical Methods in Fluids*, vol. 38, pp. 1177–1198, 2002.
- T. E. Voth and M. A. Christon, "Discretization errors associated with reproducing kernel methods: One-dimensional domains", *Computer Methods in Applied Mechanics and Engineering*, vol. 190, pp. 2429–2446, 2001.
- M. A. Christon and D. W. Roach, "The numerical performance of wavelets for PDEs: The multi-scale finite element," *Computational Mechanics*, vol. 25, pp. 230–244, 2000.
- F. Gunther, W. K. Liu, D. Diachin, and M. A. Christon, "Multi-scale meshfree parallel computation for viscous, compressible flows," *Computer Methods in Applied Mechanics and Engineering*, vol. 190, pp. 279–303, 2000.
- M. A. Christon and T. E. Voth, "Results of von Neumann analyses for reproducing kernel semi-discretizations," *International Journal for Numerical Methods in Engineering*, vol. 47, pp. 1285–1301, 2000.
- M. A. Christon, "The influence of the mass matrix on the dispersive nature of the semi-discrete, second-order wave equation," *Computer Methods in Applied Mechanics and Engineering*, vol. 173, pp. 147–166, 1999.
- M. A. Christon, D. A. Crawford, E. S. Hertel, J. S. Peery, and A. C. Robinson, *Supercomputer 1997*, FOKUS Praxis Information und Kommunikation, ch. ASCI Red - Experiences and lessons learned with a massively parallel TeraFLOP Supercomputer, pp. 12–30. Munich, Germany: K.G. Saur, June 1997. (ISBN no. 3-598-22414-1).
- S. P. Burns and M. A. Christon, "Spatial domain-based parallelism in large-scale, participating-media radiative transport applications," *Numerical Heat Transfer, Part B*, vol. 31, pp. 401–427, 1997.
- M. A. Christon, "A domain-decomposition message-passing approach to transient viscous incompressible flow using explicit time integration," *Computer Methods in Applied Mechanics and Engineering*, vol. 148, pp. 329–352, 1997.

- P. M. Gresho, S. T. Chan, M. A. Christon, and A. C. Hindmarsh, "A little more on stabilized Q1Q1 for transient viscous incompressible flow," *International Journal for Numerical Methods in Fluids*, vol. 21, pp. 837–856, 1995.
- M. A. Christon, P. J. Burns, and R. A. Sommerfeld, "Quasi-steady temperature gradient metamorphism in idealize, dry snow," *Numerical Heat Transfer, Part A - Applications*, vol. 25, no. 3, pp. 259–278, 1994.
- P. J. Burns, J. D. Maltby, and M. A. Christon, "Surface to surface transport for photons and electrons via Monte Carlo," *Computing Systems in Engineering*, vol. 1, no. 1, pp. 75–99, 1990.
- M. A. Christon, *A 3-D Transient Microanalysis of Multi-phase Heat and Mass Transport in Ice Lattices*. PhD thesis, Colorado State University, Ft. Collins, Colorado, May 1990.
- M. A. Christon, P. Burns, and R. Sommerfeld, "A 2-D microscopic simulation of heat and mass transport in dry snow," *Chemical Engineering Communications*, vol. 87, pp. 87–105, 1990.
- M. A. Christon, P. Burns, R. Sommerfeld, and E. Thompson, *NATO ASI Series C: Proceedings on Seasonal Snow-covers: Physics, Chemistry, Hydrology*, vol. C-211, ch. Water Vapor Transport in Snow, A 2-D Simulation of Temperature Gradient Metamorphism, pp. 37–62. Dordrecht, Holland: D. Reidel Publishing, July 1987.
- M. A. Christon, "A finite element model of temperature gradient metamorphism in dry snow," Master's thesis, Colorado State University, Ft. Collins, Colorado, May 1986.
- M. A. Christon, P. Burns, R. Sommerfeld, and E. Thompson, *Acid Deposition in Colorado - A Potential or Current Problem*, ch. A 2-D Finite Element Simulation of Temperature Gradient Metamorphism, pp. 57–69. Cooperative Institute for Research in the Atmosphere, Colorado State University, Ft. Collins, Colorado, 1986. (ISBN no. 0737-5353-6).

Publications – Non-traditional

- M. A. Christon, *International Journal for Numerical Methods in Fluids*, cover image of HYDRA results for cylinder vortex shedding at a Reynolds number of 250, 1994.
- M. A. Christon, "Avalanches and Thermal Gradients in Depth Hoar," *pixel*, March/April issue, pp. 9-10, 1991.
- M. A. Christon, P. Burns, "The Underworld of Ice, Three Dimensional Microanalysis of Temperature Gradient Metamorphism," *Projects in Scientific Computing 1989-90*, Pittsburgh Supercomputing Center, pp. 34-35, 1990.
- M. A. Christon, R. Schweitzer, E. Thigpen, "Cover Story - Going with the Flow," Cover and Cover Story for *Supercomputing Review*, pp. 4-5, February, 1989.
- M. A. Christon, P. Burns, R. Sommerfeld, "CRAY CHANNELS - User News," Color Images for User News article in *CRAY CHANNELS Magazine*, pp. 34-35, Winter Edition, 1989.

Publications – Conference Proceedings

- H. T. Ahn, M. Shashkov, and M. A. Christon, "The moment-of-fluid method in action," in *Third Asian-Pacific Congress on Computational Mechanics*, no. LA-UR-07-6854, 2007.

- M. A. Christon and R. S. Patil, "A finite element projection method for low-Mach number reacting flows," to appear in *Third MIT Conference on Computational Fluid and Solid Mechanics* (K. J. Bathe, ed.), (New York), Elsevier, June 2005.
- M. A. Christon, P. M. Gresho, and S. B. Sutton, "Computational predictability of natural convection flows in enclosures", in *First MIT Conference on Computational Fluid and Solid Mechanics*, (K.J. Bathe, ed.), Cambridge, Massachusetts, pp. 1465–1468, June, 2001.
- M. A. Christon, "LS-DYNA and the 8:1 differentially-heated cavity, in *First MIT Conference on Computational Fluid and Solid Mechanics*, (K.J. Bathe, ed.), Cambridge, Massachusetts, pp. 1460–1464, June, 2001.
- M. A. Christon, "The new incompressible flow capabilities in LS-DYNA," in *6th International LS-DYNA Users Conference 2000*, (ETA, ed.), Dearborn, Michigan, April, 2000.
- S. P. Burns, K. G. Budge, and M. A. Christon, "Parallel iterative and direct methods for transport calculations on unstructured grids," in *Ninth SIAM Conference on Parallel Processing for Scientific Computing*, San Antonio, Texas, SIAM, March 1999.
- J. E. Sturtevant, M. A. Christon, P. D. Heermann, and P.-C. Chen, "PDS/PIO: Lightweight libraries for collective parallel I/O," in *SC98 Proceedings*, Orlando, Florida, IEEE Supercomputing '98, November 1998.
- M. A. Christon, D. W. Roach, and T. E. Voth, "The numerical performance of wavelets and reproducing kernels for PDE's," in *International Conference on Computational Engineering Science*, Atlanta, Georgia, October 1998.
- M. A. Christon and D. E. Carroll, "An unstructured-grid, parallel, projection solver for computing low-speed flows," in *International Conference on Computational Engineering Science*, Atlanta, Georgia, October 1998.
- T. E. Voth and M. A. Christon, "Results of von Neumann analyses for reproducing kernel semi-discretizations," in *Fourth World Congress on Computational Mechanics*, Buenos Aires, Argentina, June 1998. (*invited paper*).
- B. Kornblum, R. McCallen, M. A. Christon, and W. Kollman, "Laminar backward-facing step flow using the finite element method," in *ASME Fluids Engineering Division - Summer Meeting*, ASME, 1996. (LLNL UCRL-JC-121662).
- D. K. Lewis, J. F. DeFord, K. S. Kunz, C. S. Landrum, D. J. Steich, S. E. Bumpas, M. A. Christon, T. R. Donich, J. D. Foch, G. L. Goudreau, J. J. Olivera, and S. J. Wineman, "Acoustic modeling code development for time domain, broad bandwidth computations," in *IEEE Ultrasonics Symposium* (M. Levy, S. C. Schneider, and B. R. McAvoy, eds.), pp. 733–736, November, 1994.
- M. A. Christon, S. J. Wineman, G. L. Goudreau, and J. D. Foch, "A mixed time integration method for large scale acoustic fluid-structure interaction," in *High Performance Computing in Computational Dynamics*, pp. 25–38, ASME, November 1994. (LLNL UCRL-JC-117820).
- P. M. Gresho, S. T. Chan, and M. A. Christon, "An equal-order approximate projection FEM," in *Tenth International Conference on Computational Methods in Water Resources*, Heidelberg, Germany, July 1994. (LLNL UCRL-JC-115897).

- M. A. Christon, “Visualization methods for high-resolution, transient, 3-D, finite element simulations,” in *International Workshop on Visualization*, Paderborn, Germany, January 1994. (*invited paper*, LLNL UCRL-JC-119879).
- M. A. Christon and T. E. Spelce, “Visualization of high resolution three-dimensional nonlinear finite element analyses,” in *Visualization '92*, Boston, Massachusetts, pp. 324–331, IEEE, 1992. (LLNL UCRL-JC-110110).
- M. A. Christon, “A vectorized 3-D finite element model for transient simulation of two-phase heat transport with phase transformation and a moving interface,” in *IEEE Supercomputing '90*, New York, pp. 436–445, IEEE, November 1990.
- M. A. Christon, P. J. Burns, and R. A. Sommerfeld, “3-D transient heat and mass transport in microscopic ice lattices,” in *Heat Transfer in Frost and Ice, Packed Beds, and Environmental Discharges*, pp. 25–33, ASME HTD Vol. 139, June 1990.
- P. J. Burns, M. A. Christon, R. Schweitzer, O. M. Lubeck, H. J. Wasserman, M. L. Simmons, and D. V. Pryor, “Vectorization of Monte Carlo particle transport: An architectural study using the LANL benchmark: GAMTEB,” in *Supercomputing '89*, pp. 10–20, IEEE Computer Society, November 1989.
- M. A. Christon, P. Burns, and R. Sommerfeld, “A 2-D simulation of heat and mass transport in dry snow,” in *Heat Transfer in Geophysical and Geothermal Systems*, pp. 1–8, ASME HTD, vol. 76, August 1987.

Publications – Technical Reports

- M. A. Christon, G. A. Dilts, M. M. Francois, A. J. Lupinetti, M. L. Hall, N. T. Padial-Collins, M. K. Rivera, M. J. Shashkov, J. T. Turner, M. P. Wilkerson, and D. Z. Zhang, “Actinide separation science: Fluid physics, interface dynamics and reaction chemistry,” Tech. Rep. LA-UR-07-4601, Los Alamos National Laboratory, July 2007.
- P. Bochev, M. Christon, S. Collis, R. Lehoucq, J. Shadid, A. Slepoy, and G. Wagner, “A mathematical framework for multiscale science and engineering: the variational multiscale method and interscale transfer operators,” SAND2004-2871, Sandia National Laboratories, Albuquerque, New Mexico, June 2004.
- M. A. Christon and T. E. Voth, “LESTATS User’s Manual,” Tech. Rep. SAND2003-3907, Sandia National Laboratories, Albuquerque, New Mexico, October 2003.
- M. A. Christon, D. I. Ketcheson, and A. C. Robinson, “A generalized simulation framework for hyperbolic conservation laws,” Tech. Rep., Sandia National Laboratories, Albuquerque, New Mexico, April 2003.
- M. A. Christon, “GILA – User Manual, version 1.0 – NS-SS,” Tech. Rep. SAND2003-1781, Sandia National Laboratories, Albuquerque, New Mexico, April 2003.
- M. A. Christon, T. E. Voth, and M. J. Martinez, “Generalized Fourier analyses of semi-discretizations of the advection-diffusion equation,” Tech. Rep. SAND2002-3866, Sandia National Laboratories, Albuquerque, New Mexico, November 2002.

- K. H. Brown, S. P. Burns, and M. A. Christon, "Coupled Eulerian-Lagrangian methods for earth penetrating weapon applications," Tech. Rep. SAND2002-1014, Sandia National Laboratories, Albuquerque, New Mexico, May 2002.
- R. C. Schmidt, T. M. Smith, P. DesJardin, T. E. Voth, M. A. Christon, A. R. Kerstein, and S. Wunsch, "On the development of the large eddy simulation approach for modeling turbulent flow: LDRD Final Report," Tech. Rep. SAND2002-0807, Sandia National Laboratories, Albuquerque, New Mexico, March 2002.
- M. A. Christon, "LS-DYNA's Incompressible Flow Solver – User's Manual", Livermore Software Technology Corporation, Livermore, California, October, 2000.
- M. A. Christon, R. S. Baty, S. P. Burns, D. W. Roach, T. G. Trucano, T. E. Voth, J. R. Weatherby, and D. Womble, "An investigation of wavelet bases for grid-based multi-scale simulations – Final Report," Tech. Rep. SAND98-2456, Sandia National Laboratories, Albuquerque, New Mexico, September 1998.
- M. A. Christon, "HYDRA: A finite element computational fluid dynamics code - User Manual," Tech. Rep. UCRL-MA-121344, Lawrence Livermore National Laboratory, June 1995.
- M. A. Christon, "The future of finite element applications on massively parallel supercomputers," Tech. Rep. UCRL-ID-118354, Lawrence Livermore National Laboratory, Livermore, California, 1994.
- M. A. Christon, *Engineering Research, Development and Technology, Section 2*, vol. Section 2, ch. HYDRA: A Flow Solver for Transient Incompressible Viscous Flow, pp. 25–28. Livermore, California: Lawrence Livermore National Laboratory, UCRL-53868-92 ed., 1994.
- M. A. Christon, *Engineering Research, Development and Technology, Section 2*, vol. Section 2, ch. An Explicit Finite Element Code for Linear Structural Acoustics, pp. 49–53. Livermore, California: Lawrence Livermore National Laboratory, UCRL-53868-92 ed., 1994.
- M. A. Christon, "PING: An explicit finite element code for linear structural acoustics - user manual," Tech. Rep. UCRL-MA-114536, Lawrence Livermore National Laboratory, May 1993.
- M. A. Christon, *Engineering Research, Development and Technology, Section 2*, vol. Section 2, ch. HYDRA: A Flow Solver for Three-Dimensional, Transient, Incompressible, Viscous Flow, pp. 19–21. Livermore, California: Lawrence Livermore National Laboratory, UCRL-53868-92 ed., 1992.
- M. A. Christon and D. Dovey, "INGRID, A 3-D mesh generator for modeling nonlinear systems - User Manual," Tech. Rep. UCRL-MA-109790, Lawrence Livermore National Laboratory, Livermore, California, September 1992.
- C. Hoover, M. A. Christon, R. Whirley, and A. J. De Groot, *The 1992 MPCII Yearly Report*, ch. Explicit Nonlinear Structural Dynamics Models for Massively Parallel Computers. Lawrence Livermore National Laboratory, UCRL-ID-10722-92 ed., 1992.
- M. A. Christon and R. Whirley, *The 1991 MPCII Yearly Report*, ch. Explicit Structural Analysis in a Concurrent Computing Environment. Lawrence Livermore National Laboratory, UCRL-ID-10722 ed., 1991.

- M. A. Christon, *Engineering Research, Development and Technology, Section 2*, vol. Section 2, ch. Enhancement and Quality Assurance for INGRID, pp. 34–36. Livermore, California: Lawrence Livermore National Laboratory, UCRL-53868-91 ed., 1991.
- M. A. Christon and T. Spelce, *Engineering Research, Development and Technology, Section 2*, vol. Section 2, ch. Visualization of High Resolution, Three-Dimensional, Nonlinear Finite Element Analyses, pp. 29–33. Livermore, California: Lawrence Livermore National Laboratory, UCRL-53868-91 ed., 1991.

Invited Lectures

- “Multiscale something or other”, *14th International Finite Elements in Flow Problems*, Santa Fe, NM, March 26–28, 2007.
- “High-performance solution methods for transient incompressible and low-Mach flows”, *Applied Mathematics Seminar Series*, Colorado State University, April 4, 2002.
- “LS-DYNA – Application driven strategies for high-performance computing,” *SC-2000*, Dallas, Texas, November 9, 2000.
- “Pressure stabilized approximate projection methods for time-accurate incompressible flow,” *Finite Elements in Flow Problems 2000*, University of Texas Austin, April 30 - May 4, 2000.
- “The div, grad and two projections – parallel solution methods for low-speed flows,” *Computational Mechanics Colloquia*, Northwestern University, May 30, 1998.
- “ASCI Red - Experiences and lessons learned with a massively parallel TeraFLOP supercomputer,” *Supercomputer '97 Seminar - Mannheim*, University of Mannheim, Mannheim, Germany, June 19-21, 1997.
- “Time Domain Structural Acoustics using Implicit-Explicit Partitioning,” invited lecture, *ONR Structural Acoustics Program Review*, Florida Atlantic University, Boca-Raton, Florida, January 9-12, 1995.
- “Unstructured Mesh Visualization Methods for Finite Element Simulations,” invited lecture, *NAS New Technology Seminar*, NASA Ames Research Center, Moffet Field, California, March 29, 1994.
- “Scientific Visualization Methods for High Resolution, Three-Dimensional, Finite Element Simulations,” invited keynote lecture, *DFG-Workshop on Visualization*, Paderborn, Germany, January 18-21, 1994.
- “PING: A Time Domain Approach to Structural Acoustics,” invited lecture presented to the working group on Finite Element Methodologies and Materials Processing Fundamentals, Army High Performance Computing Research Center, University of Minnesota, Minneapolis, Minnesota, October 28, 1993.
- “DYNA for Fluids: A Transient Incompressible Viscous Flow Solver,” presented to Warren P. Chernock, Deputy Science & Technology Advisor, DOE LDRD Review, Lawrence Livermore National Laboratory, Livermore, California, August 5, 1993.

Selected Presentations

- “From submarines to plumes – exact and approximate projection methods for incompressible flow,” presented at *University of New Mexico*, October 12, 1999.
- “I/O Issues for Unstructured-Grid Applications”, Accelerated Strategic Computing Initiative - Scalable I/O Workshop, Livermore, California, March, 1997.
- “Computational Fluid Dynamics Algorithms for Fire Simulation - Preliminary Jet and Plume Calculations,” Accelerated Strategic Computing Initiative - PI Meeting, Vandenberg Air Force Base, California, November 6, 1996.
- “A Mixed Time Integration Method for Large Scale Acoustic Fluid-Structure Interaction,” presented at: *Winter Annual Meeting of the ASME*, Chicago, Illinois, November 6-11, 1994.
- “Implementation Strategies for a Three-Dimensional, Transient Incompressible Viscous Flow Solver on Vector and Parallel Supercomputers,” *Symposium on Parallel Finite Element Computations*, Army High Performance Computing Research Center, University of Minnesota, Minneapolis, Minnesota, October 25-27, 1994.
- “A Vectorized 3-D Finite Element Model for Transient Simulation of Two-Phase Heat Transport with Phase Transformation and a Moving Interface,” *ACM Supercomputing '90*, New York, New York, November 12-16, 1990.
- “Water Vapor Transport in Snow, A 2-D Simulation of Temperature Gradient Metamorphism,” *NATO Advanced Study Institute on the Chemical Dynamics of Seasonal Snowcovers*, Les Arcs, France, July 13-25, 1986.